

07-03-00

A



**NON-PROVISIONAL  
UTILITY PATENT APPLICATION  
TRANSMITTAL - 37 CFR 1.53(b)**

☐ Duplicate  
(check, if applicable)



Assistant Commissioner for Patents  
**BOX PATENT APPLICATION**  
Washington, DC 20231

**Attorney Docket No. 9003-269 (A 00 115 B US)**  
**First Named Inventor: Michael Jacob, et al.**  
**Express Mail Label No. EL631602347US**  
**Total Pages of Transmittal Form: 2**

Transmitted herewith for filing is the non-provisional utility patent application entitled:

**PROCESS FOR MANUFACTURING INDUSTRIAL DERTERGENTS  
AND COMPONENTS THEREOF**

which is:

an ☒ Original; or

a ☐ Continuation, ☐ Divisional, or ☐ Continuation-in-part (CIP)  
of prior Application No. , filed .

☐ This non-provisional patent application is based on Provisional Patent Application  
No. , filed .

Enclosed are:

- ☒ Specification (including Abstract) and claims: 11 pages.
- ☒ Newly executed Declaration (facsimile copy).
- ☐ Copy of Declaration from prior application.
- ☐ Separate Power of Attorney (including 37 CFR 3.73(b) statement, if applicable).
- ☒ 1 sheet of drawings (formal) plus one copy.
- ☐ Microfiche computer program (Appendix).
- ☐ Nucleotide and/or Amino Acid Sequence Submission, including:
  - ☐ Computer readable copy ☐ Paper Copy ☐ Verified Statement.
- ☒ Under PTO-1595 cover sheet, an assignment of the invention.
- ☒ Certified copy(ies) of European Application No(s). 00103515.3 filed February 18,  
2000, is filed: ☒ herewith or ☐ in prior application
- ☐ Verified Statement Claiming Small Entity Status under 37 CFR 1.9 and 1.27.
  - ☐ was filed in the prior non-provisional application, and such  
status is still proper and desired (37 CFR 1.28(a));
  - ☐ is enclosed herewith; ☐ is no longer desired.
- ☐ Preliminary Amendment.
- ☐ Information Disclosure Statement, PTO-1449, and cited references.

The following fees are being paid by:

☒ Our firm's check enclosed herewith; or

[ ] This authorization to charge our firm's **Deposit Account No. 50-1017 (Billing No. 209003.0269)**.

**[X]** Filing fee in the amount of **\$690.00** as calculated below.

			SMALL ENTITY			LARGE ENTITY	
CLAIMS	NO. FILED	NO. EXTRA	BASIC FEE: \$345			BASIC FEE: \$690	
Total	3-20=	0	X9	\$	OR	X18	\$
Independent	1- 3=	0	X39	\$	OR	X78	\$
Multiple Dependent Claims Present:			\$130	\$	OR	\$260	\$
			<b>TOTAL</b>	\$	OR	<b>TOTAL</b>	<b>\$690.00</b>

**[X]** Any additional fees required under 37 C.F.R. § 1.16.

**[X]** Any additional fees required under 37 C.F.R. §1.17.

**[X]** In the event that a Petition for Extension of Time is required during the prosecution of this application, but not submitted, please charge any extension fee under 37 C.F.R. §1.136(a) to our Deposit Account noted above.

**[X]** Any additional fees/overpayments are authorized to be charged/credited to the above Deposit Account. One additional copy of this paper is enclosed for accounting purposes.

**CORRESPONDENCE ADDRESS:**

June 30, 2000  
(Date)

By:

## William W. Schwarze

Registration No. 25,918

**AKIN, GUMP, STRAUSS, HAUER & FELD, L.L.P.**

## One Commerce Square

2005 Market Street - Suite 2200

Philadelphia, PA 19103

Telephone: 215-965-1200

**Direct Dial: 215-965-1270**

Facsimile: 215-965-1210

E-Mail: [wschwarze@akingump.com](mailto:wschwarze@akingump.com)

**[X] Customer Number or Bar Code Label: 000570**

WWS:jf

## Enclosures

[illegible]

PATENT  
Attorney Docket  
9003-269  
(A 00 115 B US)

## **TITLE OF THE INVENTION**

Process for Manufacturing Industrial Detergents  
and Components Thereof

## **BACKGROUND OF THE INVENTION**

The invention relates to a process for manufacturing industrial detergents and industrial detergent components in granular or agglomerate form on a dry material basis in an essentially horizontally oriented fluidized bed.

It is known in the production of detergents or industrial detergent components to manufacture the respective individual components by spray drying or spray granulation and then to mix the so-manufactured individual components according to the formula. A unification of different individual particles does not occur with the mixing by this process.

It is disadvantageous that, depending on the quality of the mixing of the individual components, a more or less non-homogenous distribution of the different component results. During transport and in storage the components can easily become separated inside the packaging or container. Due to the large proportion of dust and the tendency toward separation, the quality of the detergent or detergent components is considerably worsened. This acts in a very disadvantageous manner, since in most cases these dusts are to be classified as harmful to health. Furthermore, with increasing particle sizes there exists an ever-increasing tendency toward dust explosions.

## **SUMMARY OF THE INVENTION**

An object of the invention is to develop a process for manufacturing industrial detergents and industrial detergent components in granular or agglomerate form on a dry basis, which distinguish themselves from the known granulates by a

homogenous composition of the granulate or agglomerate composed of the individual raw material components, including the binder and the moisture content, which have a high resistance to mechanical stresses, which are easily dispersible in water, and which are low in dust or almost dust-free.

5                   The above object is achieved according to the invention by the process for manufacturing industrial detergents and industrial detergent components as a finished product in granulate or agglomerate form on a dry basis in an essentially horizontally oriented fluidized bed, comprising:

10                   a)       performing different process steps, including heating, agglomeration, coating, drying and cooling, for manufacturing the finished product in a single or multiple stage fluidized bed;

                    b)       supplying solid powdered starting material in a first process step to the fluidized bed in an area of fluidizing space;

15                   c)       supplying process air to the different process steps from beneath the fluidized bed, wherein a process temperature or supply temperature for agglomeration of the product is a function of a decomposition temperature of individual material components of the finished product and lies in a range of about 20 to 300°C, and the process air for cooling has a temperature lying in a range of about -20 to +30°C;

20                   d)       supplying a binder, water and/or one or more material components in the form of solutions, suspensions or melts to the solid in the fluidized bed in the area of the fluidizing space over an entire process range using a spray or injection system, wherein the dry portion in the spray medium comprises 0 to 100%;

25                   e)       fluidizing the individual components in the area of the fluidizing space to form a solid mixture comprising granulates of homogenous composition;

                    f)       reducing a flow speed of the process air supplied from below to the fluidizing space in an expansion zone located above the fluidizing space and formed by cross-sectional widenings, such that a pre-separation of particles

entrained from the fluidizing space and a return of the pre-separated particles into the fluidizing space occur; and

- g) separating process dust with a dedusting mechanism in an integrated filter system adjoining above the expansion zone and returning the process dust to the fluidizing space. Advantageous embodiments of the process are set forth in dependent claims.

The manufacture of the product is accomplished by fluidized bed agglomeration / granulation in an essentially horizontally oriented fluidized bed. In the process, a binder and/or components in the form of solutions, suspensions, or melts are added to the solid material in the fluidized bed via an injection system. The binder content in the product can amount to about 1 to 35 mass percent. Through the energy introduced via the process air, drying and compacting of the agglomerate / granulate forming in the injection area of the fluidized bed occur. In this connection, the supply temperature of the process air is from about 20°C up to the decomposition temperature of the individual materials. By adjusting the drying parameters, the product moisture can be varied. Values starting at 0 mass percent upwards are possible depending on the liquid intake. The particles entrained by the process air from the fluidized bed, particularly the fine dust, are separated from the air in an expansion zone provided with cross-sectional widenings integrated in the fluidized bed apparatus and in a filter system connected to it, and are conveyed back into the fluidized bed and agglomerated there. A low-dust or dust-free product thereby results having a granularity range of about 0.2 to 2.0 mm.

The above-described process for manufacturing the end product is carried out in different process stages, for example heating up, agglomeration, coating, drying, and cooling, one after the other, in a single or multiple stage fluidized bed.

The advantage of the process according to the invention for manufacturing industrial detergents and industrial detergent components in granular or agglomerate form on a dry basis consists in that by the fluidization of the material in the fluidized bed, a uniformly homogenous composition of individual granules or





to about 0 to 100%, while the binder proportion in the final product including the moisture amounts to about 1 to 35%.

The spray system 8 comprises a known single or multiple stage nozzle, wherein the injection direction can be accomplished from top to bottom, or vice versa, or at an angle. By the creation of the fluidizing space II and the supply of additional components via the spray system 8, a homogenous solid mixture results, wherein granulates are formed having a homogenous composition formed from the respective individual components.

Above the fluidizing space II is connected the expansion zone III, in which the flow speed of the process air 1 is reduced by cross-sectional widenings. The side walls of the expansion zone III exhibit a steep inclination of 15-45° to the vertical, so that a cross-sectional widening up to the connected filter system IV results. By the reduction of the flow speed of the process air 1, a pre-separation of particles entrained from the fluidizing space II occurs, which is conveyed back into the fluidizing space.

An integrated filter system IV is connected to the expansion zone III to remove the dust from the process air 1 and, at the same time, return the dust into the fluidized bed 9 located beneath it. The filter system IV comprises filter elements 7, which can be cleaned mechanically by the filter deduster 6 and/or by compressed air 5 in pulses. The use of other known filter elements is possible. With the integrated filter system IV, contact with the dusts is prevented, and the danger of dust explosion in the interior of the fluidized bed apparatus is reduced.

The cleaned process air leaves the system as exhaust air 4, while the finished product is likewise carried out from the system via a cellular wheel sluice 12 as a pressure lock via the product discharge 3.

The system can have added to it further equipment components, for example for suppression/reduction of explosions or for supporting the solid material movement, e.g. by vibrating devices.

The invention will now be illustrated in detail with reference to the following specific, non-limiting examples.



Variable	Mean	SD	Min	Max
Age	34.5	10.2	22	55
Gender	0.5	0.5	0	1
Marital status	0.6	0.5	0	1
Education	12.5	1.5	10	15
Income	1500	500	1000	2500
Health status	0.8	0.2	0	1
Smoking status	0.3	0.5	0	1
Alcohol consumption	0.2	0.4	0	1
Exercise frequency	0.5	0.5	0	1
Stress level	0.7	0.3	0	1
Sleep quality	0.6	0.4	0	1
Work satisfaction	0.5	0.5	0	1
Life satisfaction	0.6	0.4	0	1
Overall health	0.7	0.3	0	1
Physical activity	0.4	0.5	0	1
Mental health	0.6	0.4	0	1
Social support	0.5	0.5	0	1
Work-life balance	0.5	0.5	0	1
Financial stability	0.6	0.4	0	1
Family harmony	0.7	0.3	0	1
Personal growth	0.6	0.4	0	1
Community involvement	0.5	0.5	0	1
Environmental awareness	0.6	0.4	0	1
Cultural appreciation	0.7	0.3	0	1
Artistic expression	0.5	0.5	0	1
Volunteer work	0.4	0.5	0	1
Charitable contributions	0.3	0.4	0	1
Philanthropic activities	0.2	0.3	0	1
Leadership roles	0.4	0.5	0	1
Networking opportunities	0.5	0.5	0	1
Professional development	0.6	0.4	0	1
Continuous learning	0.7	0.3	0	1
Adaptability to change	0.6	0.4	0	1
Resilience to stress	0.7	0.3	0	1
Emotional regulation	0.6	0.4	0	1
Interpersonal skills	0.7	0.3	0	1
Conflict resolution	0.6	0.4	0	1
Decision-making skills	0.7	0.3	0	1
Problem-solving abilities	0.8	0.2	0	1
Time management	0.6	0.4	0	1
Organization skills	0.7	0.3	0	1
Communication skills	0.8	0.2	0	1
Teamwork abilities	0.7	0.3	0	1
Leadership qualities	0.6	0.4	0	1
Networking skills	0.5	0.5	0	1
Professional growth	0.7	0.3	0	1
Career satisfaction	0.6	0.4	0	1
Job security	0.5	0.5	0	1
Work environment	0.6	0.4	0	1
Supervisor relationship	0.7	0.3	0	1
Peer relationships	0.6	0.4	0	1
Subordinate relationships	0.5	0.5	0	1
Client relationships	0.6	0.4	0	1
Vendor relationships	0.5	0.5	0	1
Community relationships	0.6	0.4	0	1
Family relationships	0.7	0.3	0	1
Friendship quality	0.6	0.4	0	1
Marital satisfaction	0.7	0.3	0	1
Parenting satisfaction	0.6	0.4	0	1
Child development	0.7	0.3	0	1
Elder care	0.5	0.5	0	1
Healthcare access	0.6	0.4	0	1
Insurance coverage	0.7	0.3	0	1
Financial planning	0.6	0.4	0	1
Investment strategies	0.5	0.5	0	1
Risk management	0.6	0.4	0	1
Emergency preparedness	0.7	0.3	0	1
Disaster response	0.6	0.4	0	1
First aid training	0.5	0.5	0	1
Fire safety	0.6	0.4	0	1
Earthquake preparedness	0.7	0.3	0	1
Severe weather response	0.6	0.4	0	1
Public safety awareness	0.7	0.3	0	1
Crime prevention	0.6	0.4	0	1
Traffic safety	0.7	0.3	0	1
Workplace safety	0.8	0.2	0	1
Home safety	0.7	0.3	0	1
Public safety	0.6	0.4	0	1
Community safety	0.7	0.3	0	1
Environmental safety	0.6	0.4	0	1
Health and safety	0.7	0.3	0	1
Food safety	0.6	0.4	0	1
Water safety	0.7	0.3	0	1
Fire safety	0.8	0.2	0	1
Earthquake safety	0.7	0.3	0	

5

Supply air temperature      150°C

Spray medium                      30% binder solution

10

### 2<sup>nd</sup> Chamber Cooling:

Exit temperature of detergent agglomerate 35°C

15

75 % agglomeration

Solid and uniformly homogenous agglomerates were created, having a particle size of 400 to 800  $\mu\text{m}$ , without dust portions  $< 200 \mu\text{m}$ , and easily dissolvable in water.

## 20

In this Example, the process was carried out in a standard fluidized bed installation having the following dimensions:

Width of fluidizing space: 1.0 m

25

Height of fluidizing space: 0.8 m

Height of expansion zone: 1.0 m

Height of entire apparatus: 5.5 m

Total fluidizing surface:  $5 \text{ m}^2$

The side walls in the fluidizing space were parallel and vertical, and in the expansion zone were inclined at 30° to the vertical. The spraying was from above with a total of eight (8) nozzles.

In the process, 2550 kg/h of a pre-mixed, powdered detergent (active  
5 detergent, enzyme, softener, and other adjuvants) were sprayed into the fluidized bed  
with 1000 kg/h of a 30% binder solution (ethylene glycol polymer in water) and  
agglomerated therewith. The agglomeration occurred in a first chamber of the  
fluidized bed installation on a surface of 3.5 m<sup>2</sup>. The fluidized bed was generated by  
18,000 kg/h of hot air at 150°C. The temperature in the fluidized bed was about 60°C.  
10 In a second chamber of the fluidized bed the cooling of the agglomerate took place on a  
surface of 1.25 m<sup>2</sup> with 6000 kg/h of cold cooling air at 25°C. This air stream warmed  
itself to a mean temperature of 45°C.

At the product outlet a mass stream of 3000 kg/h exited at a temperature  
of 35°C. The air streams from the agglomeration and cooling chambers exited the  
15 fluidized bed installation as one exhaust gas stream having a temperature of about  
55°C. The inlet moisture of the pre-mixed powder was 0%, while the moisture of the  
finished product was 5%.

It will be appreciated by those skilled in the art that changes could be  
made to the embodiment(s) described above without departing from the broad  
20 inventive concept thereof. It is understood, therefore, that this invention is not limited  
to the particular embodiment(s) disclosed, but it is intended to cover modifications  
within the spirit and scope of the present invention as defined by the appended claims.

## CLAIMS

We claim:

1. A process for manufacturing industrial detergents and industrial detergent components as a finished product in granulate or agglomerate form on a dry basis in an essentially horizontally oriented fluidized bed, comprising:
  - a) performing different process steps, including heating, agglomeration, coating, drying and cooling, for manufacturing the finished product in a single or multiple stage fluidized bed;
  - b) supplying solid powdered starting material in a first process step to the fluidized bed in an area of fluidizing space;
  - c) supplying process air to the different process steps from beneath the fluidized bed, wherein a process temperature or supply temperature for agglomeration of the product is a function of a decomposition temperature of individual material components of the finished product and lies in a range of about 20 to 300°C, and the process air for cooling has a temperature lying in a range of about -20 to +30°C;
  - d) supplying a binder, water and/or one or more material components in a form of solutions, suspensions or melts to the solid in the fluidized bed in the area of the fluidizing space over an entire process range using a spray or injection system, wherein the dry portion in the spray medium comprises 0 to 100%;
  - e) fluidizing the individual components in the area of the fluidizing space to form a solid mixture comprising granulates of homogenous composition;
  - f) reducing a flow speed of the process air supplied from below to the fluidizing space in an expansion zone located above the fluidizing space and formed by cross-sectional widenings, such that a pre-separation of particles entrained from the fluidizing space and a return of the pre-separated particles into the fluidizing space occur; and

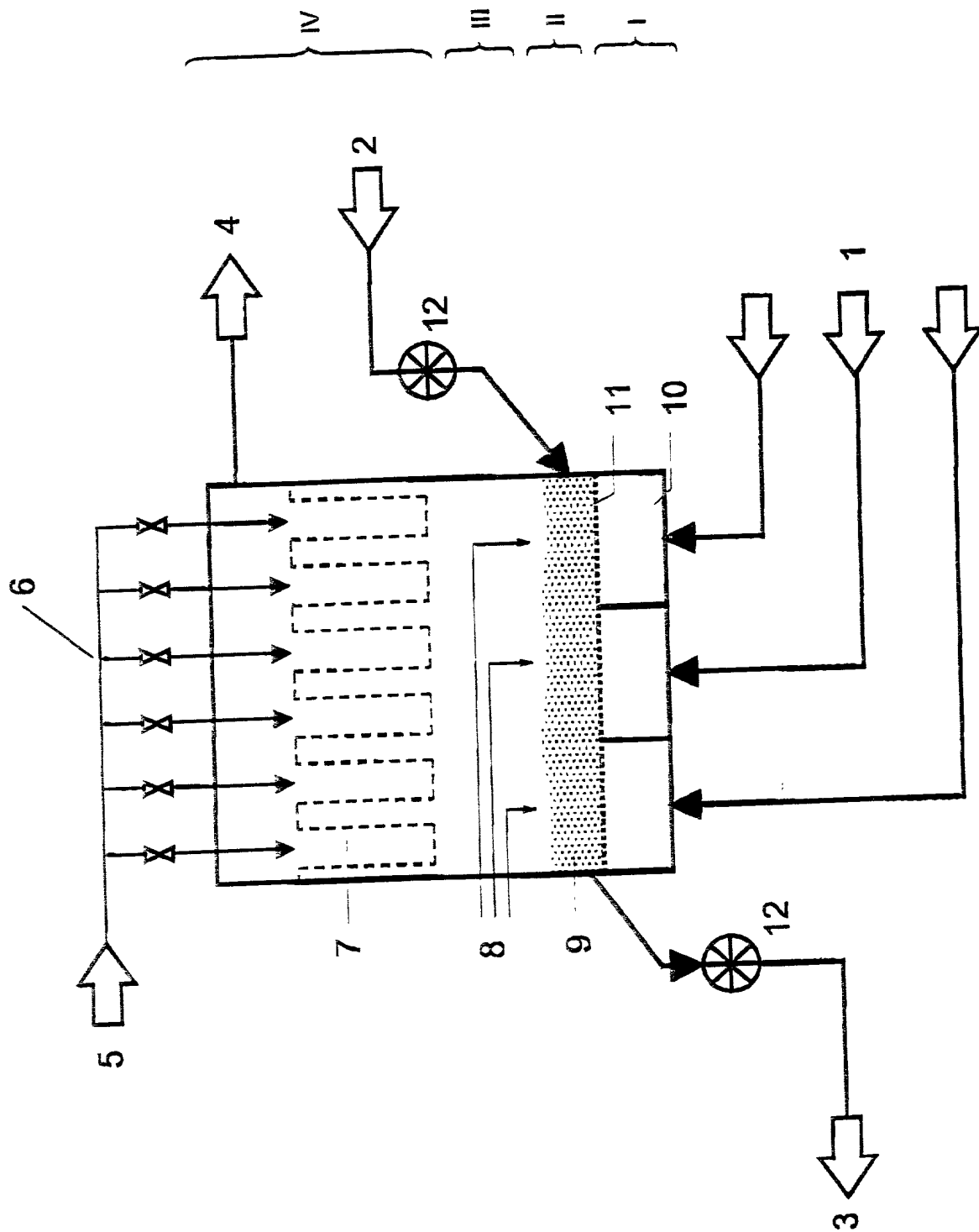
g) separating process dust with a dedusting mechanism in an integrated filter system adjoining above the expansion zone and returning the process dust to the fluidizing space.

2. The process according to claim 1, wherein the binder including moisture comprises about 1 to 35% of the finished product.

3. The process according to claim 1, wherein supplying the starting material to the fluidized bed and discharge of the finished product from the fluidized bed are performed under pressure seal from the environment.

## ABSTRACT OF THE DISCLOSURE

5 A process is provided for manufacturing industrial detergents and industrial detergent components in granular or agglomerate form on a dry basis in an essentially horizontally oriented fluidized bed. The finished detergent granulates or agglomerates are distinguished by a homogenous composition of the individual raw material components, including the binder and the moisture content, have a high resistance to mechanical stress, are readily dispersible in water, and are low in dust or almost dust-free. In the process a binder and/or components in the form of solutions, 10 suspensions, or melts are added to the solid material in the fluidized bed via a spray or injection system. Through the energy introduced via the process air, drying and compacting of the agglomerate / granulate forming in the injection area of the fluidized bed occur. The supply temperature of the process air is in a range of about 20°C up to the decomposition temperature of the individual materials. By adjusting the drying 15 parameters, the product moisture can be varied. The particles entrained by the process air from the fluidized bed are separated from the air in an expansion zone provided with cross-sectional widenings integrated into the fluidized bed apparatus and in a filter system connected to it, and are conveyed back into the fluidized bed and agglomerated there. A low-dust or dust-free product results that having a granularity range of about 20 0.2 to 2.0 mm.



EXPRESS MAIL MAILING LABEL NO. EL631602347US .

Attorney Docket No. 9003-269  
(A 00 115 B US)**DECLARATION AND POWER OF ATTORNEY**  
(Original Application)

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

**PROCESS FOR MANUFACTURING INDUSTRIAL DETERGENTS  
AND COMPONENTS THEREOF**the specification of which is attached hereto and/or was filed on June 30, 2000 as  
Application No. \_\_\_\_\_.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to herein.

I acknowledge the duty to disclose information which is material to patentability in accordance with Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d), of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

**FOREIGN PRIORITY APPLICATION(S)**

<u>00 103 515.3</u>	<u>Europe</u>	<u>18 February 2000</u>
(Number)	(Country)	(Day/month/year filed)
<u>199 04 657.3</u>	<u>Germany</u>	<u>4 February 1999</u>
(Number)	(Country)	(Day/month/year filed)

Priority Claimed  
☒ Yes ☐ No☐ Yes ☒ No

I hereby claim the benefit under Title 35, United States Code §119(e) of any United States provisional patent application(s) listed below and have also identified below any United States provisional patent application(s) having a filing date before that of the application

On which priority is claimed:

**PROVISIONAL PRIORITY PATENT APPLICATION(S)**

		<b><u>Priority Claimed</u></b>
_____	_____	<input type="checkbox"/> Yes <input type="checkbox"/> No
(Application No.)	(Filing Date)	

		<b><u>Priority Claimed</u></b>
_____	_____	<input type="checkbox"/> Yes <input type="checkbox"/> No
(Application No.)	(Filing Date)	

And I hereby appoint the registered attorneys and agents associated with **AKIN, GUMP, STRAUSS, HAUER & FELD, L.L.P.**, Customer No. 000570, as my attorneys or agents with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith.

Address all correspondence to **Customer No. 000570, namely, AKIN, GUMP, STRAUSS, HAUER & FELD, L.L.P.**, One Commerce Square, 2005 Market Street, Suite 2200, Philadelphia, Pennsylvania 19103. Please direct all communications and telephone calls to **William W. Schwarze** at 215-965-1270.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Full name of sole  
inventor, if any Michael Jacob

Inventor's Signature Michael Jacob

Date 22/06/2000

Residence Weimar, Germany

Citizenship German

Post Office Address Marcel-Paul-Strasse 134, 99427 Weimar,

Germany



Full name of second joint  
inventor, if any \_\_\_\_\_

## Karlheinz Rümpler

**Inventor's Signature**

Karl heit 2 Prinzip 4

Date \_\_\_\_\_

22/06/2000

### Residence

Weimar, Germany

## Citizenship

## German

**Post Office Address**

Lyonel-Feininger-Strasse 9, 99425 Weimar,

## Germany

- 3 -